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$2\frac{1}{3}$ documentNegativeKaonsinDenseBaryonicMatterEvgeniE. KolomeitsevE−mail:E.Kolomeitsev@nbi.dkTheNielsBohrInstitute,Blegdamsvej17,

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abstract Kaon polarization operator in dense baryonic matter of arbitrary isotopic composition is calculated including s- and p-wave kaon-baryon interactions. The regular part of the polarization operator is extracted from the realistic kaon-nucleon interaction based on the chiral and $1/N_c$ expansion. Contributions of the $\Lambda(1116)$, $\Sigma(1195)$, $\Sigma^*(1385)$ resonances are taken explicitly into account in the pole and regular terms with inclusion of mean-field potentials. The baryon-baryon correlations are incorporated and fluctuation contributions are estimated. Results are applied for K^- in neutron star matter. Within our model a second-order phase transition to the s-wave K^- condensate state occurs at $\rho_c{>}{\sim}4\rho_0$ once the baryon-baryon correlations are included. We show that the second-order phase transition to the p-wave K^- condensate state may occur at densities $\rho_c \sim 3 \div 5\rho_0$ in dependence on the parameter choice. We demonstrate that a first-order phase transition to a proton-enriched (approximately isospin-symmetric) nucleon matter with a p-wave K^- condensate can occur at smaller densities, $\rho{<}{\sim}2\rho_0$. The transition is accompanied by the suppression of hyperon concentrations.

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